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JACKSON LAKE, BUTTS, JASPER, AND NEWTON COUNTIES GEORGIA

PACIFIC NORTHWEST ENVIRONMENTAL RESEARCH LABORATORY

PREPARED FOR
NATIONAL ENVIRONMENTAL RESEARCH CENTER

JULY 1975

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ON
JACKSON LAKE
BUTTS, JASPER, AND NEWTON COUNTIES
GEORGIA

EPA REGION IV

WORKING PAPER No. 290

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16. ABSTRACT

Annual total phosphorus and total nitrogen loadings to the lake were estimated and subdivided according to either point or non-point source origin. An assessment of the lake's trophic condition and limiting nutrient is also provided. All data collected by the U.S.E.P.A. National Eutrophication Survey during the one year study of the lake and its tributaries are included in the report.

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CONTENTS

	Page
Foreword	ii
List of Georgia Study Lakes	iv
Lake and Drainage Area Map	v
Sections	
I. Conclusions	1
II. Lake and Drainage Basin Characteristics	7
III. Lake Water Quality Summary	8
IV. Nutrient Loadings	14
V. Literature Reviewed	19
VI. Appendices	20

FOREWORD

The National Eutrophication Survey was initiated in 1972 in response to an Administration commitment to investigate the nationwide threat of accelerated eutrophication to fresh water lakes and reservoirs.

OBJECTIVES

The Survey was designed to develop, in conjunction with state environmental agencies, information on nutrient sources, concentrations, and impact on selected freshwater lakes as a basis for formulating comprehensive and coordinated national, regional, and state management practices relating to point-source discharge reduction and non-point source pollution abatement in lake watersheds.

ANALYTIC APPROACH

The mathematical and statistical procedures selected for the Survey's eutrophication analysis are based on related concepts that:

a. A generalized representation or model relating sources, concentrations, and impacts can be constructed.

b. By applying measurements of relevant parameters associated with lake degradation, the generalized model can be transformed into an operational representation of a lake, its drainage basin, and related nutrients.

c. With such a transformation, an assessment of the potential for eutrophication control can be made.

LAKE ANALYSIS

In this report, the first stage of evaluation of lake and watershed data collected from the study lake and its drainage basin is documented. The report is formatted to provide state environmental agencies with specific information for basin planning [§303(e)], water quality criteria/standards review [§303(c)], clean lakes [§314(a,b)], and water quality monitoring [§106 and §305(b)] activities mandated by the Federal Water Pollution Control Act Amendments of 1972.

Beyond the single lake analysis, broader based correlations between nutrient concentrations (and loading) and trophic condition are being made to advance the rationale and data base for refinement of nutrient water quality criteria for the Nation's fresh water lakes. Likewise, multivariate evaluations for the relationships between land use, nutrient export, and trophic condition, by lake class or use, are being developed to assist in the formulation of planning guidelines and policies by EPA and to augment plans implementation by the states.

ACKNOWLEDGMENT

The staff of the National Eutrophication Survey (Office of Research & Development, U. S. Environmental Protection Agency) expresses sincere appreciation to the Georgia Department of Natural Resources for professional involvement and to the Georgia National Guard for conducting the tributary sampling phase of the Survey.

J. Leonard Ledbetter, Director of the Environmental Protection Division; Ralph S. Howard, Jr., Environmental Affairs Coordinator; Gene B. Welsh, Chief of the Water Protection Branch; Edward T. Hall, Jr., Unit Coordinator; and Broughton A. Caldwell, R. Marshall Gaddis, William D. Kennedy, and Kenneth W. Martin, Environmental Specialists, provided invaluable lake documentation and counsel during the Survey, reviewed the preliminary lake reports, and provided critiques most useful in the preparation of this Working Paper series.

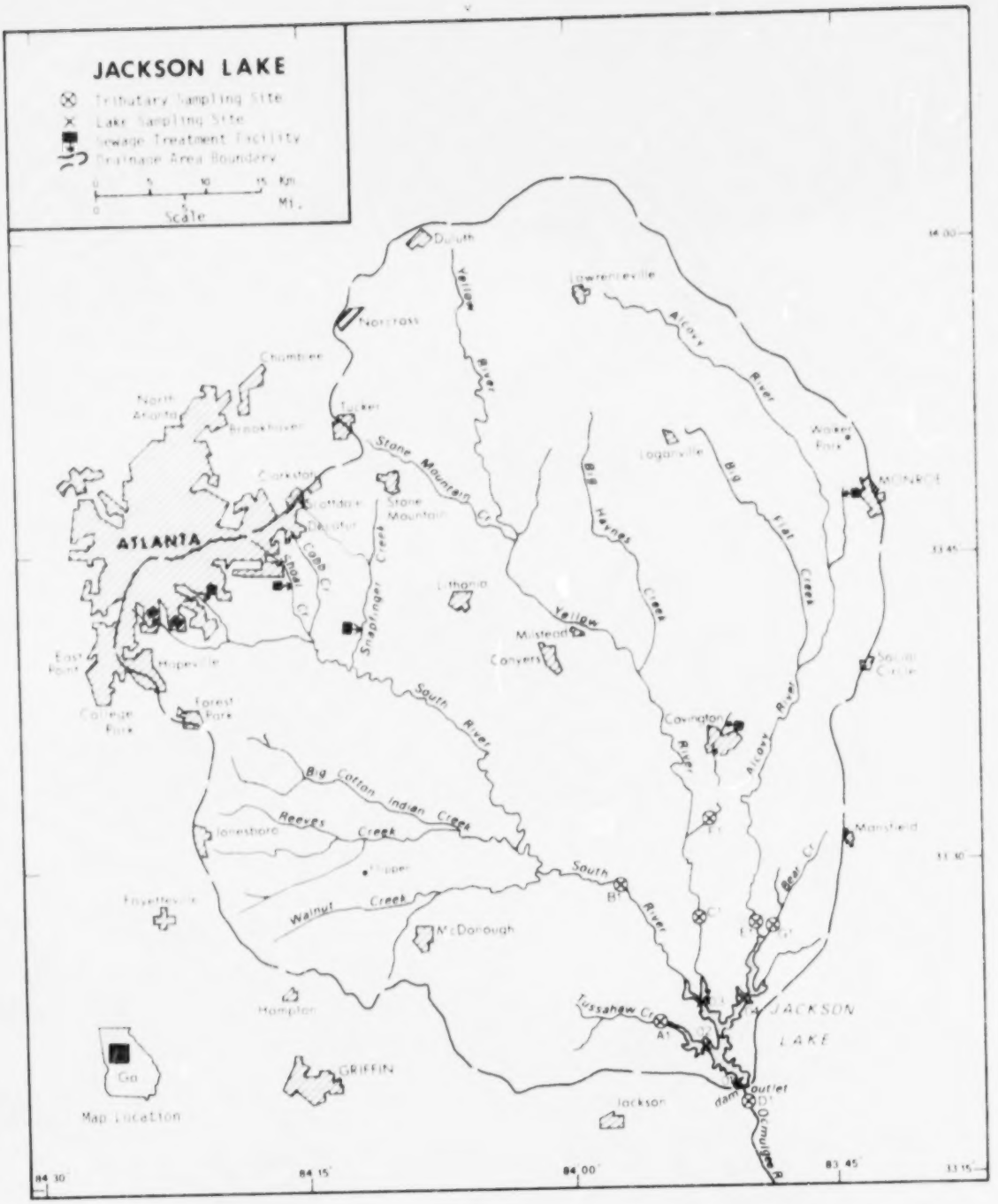
Major General Joel B. Paris, III, then the Adjutant General of Georgia, and Project Officer Lt. Colonel John R. Ranier, who directed the volunteer efforts of the Georgia National Guardsmen, are also gratefully acknowledged for their assistance to the Survey.

NATIONAL EUTROPHICATION SURVEY

STUDY LAKES

STATE OF GEORGIA

LAKE NAME	COUNTY
Allatoona	Bartow, Cherokee, Cobb
Blackshear	Crisp, Dooly, Lee, Sumpter
Blue Ridge	Fannin
Burton	Rabun
Chatuge	Towns, GA; Clay, NC
Clark Hill	Columbia, Elbert, Lincoln, McDuffie, Wilks, GA; Abbeville, McCormick, SC
Harding	Harris, GA; Chambers, Lee, AL
Hartwell	Franklin, Hart, Stephens, GA; Anderson, Oconee, Pickens, SC
High Falls	Butts, Lamar, Monroe
Jackson	Butts, Jasper, Newton
Nottely	Union
Seminole	Decatur, Seminole, GA; Jackson, FL
Sidney Lanier	Dawson, Forsyth, Gwinnett, Hall, Lumpkin
Sinclair	Baldwin, Hancock, Putnam
Walter F. George	Clay, Quitman, Stewart, GA; Barbour, Henry, Russell, AL


JACKSON LAKE
Tributary Sampling Site
Lake Sampling Site
Sewage Treatment Facility
Drainage Area Boundary
Scale
Km
Mi.
ATLANTA
Duluth
Lawrenceville
Norcross
Chamblee
North Atlanta
Brookhaven
Tucker
Stone Mountain Cr.
Clarkston
Decatur
Stone Mountain
Yellow River
Alcovy River
Loganville
Walnut Park
MONROE
Big Haynes Creek
Big Flat Creek
Peachtree Creek
Nancy Creek
Snapfinger Creek
Lithonia
Yellow
Mistead
Conyers
East Point
College Park
Hapeville
Forest Park
South River
Covington
Social Circle
Big Cotton Indian Creek
Reeves Creek
Jonesboro
Flipper
Fayetteville
Walnut Creek
McDonough
Mansfield
Bear Cr.
Hampton
Tussahaw Cr.
JACKSON LAKE
Outlet dam
Jackson
GRIFFIN
Ocmulgee R.
Ga
Map Location
84 30
84 15
84 00
83 45
33 15
33 30
33 45
34 00

JACKSON LAKE*

STORET NO. 1309

I. CONCLUSIONS

A. Trophic Condition:

Survey data indicate that Jackson Lake is eutrophic and is further deteriorating at a rapid rate as evidenced by the heavy blue-green algal blooms that have occurred in the past three years. Jackson Lake ranked thirteenth in overall trophic quality when the 14 Georgia lakes sampled in 1973 were compared using a combination of six parameters**. Twelve of the lakes had less median total phosphorus, median dissolved phosphorus, median inorganic nitrogen, and mean chlorophyll a; and 11 lakes had greater mean Secchi disc transparency. Dissolved oxygen was markedly depressed or even depleted in essentially all samples taken at 4.6 meters and deeper.

Siltation is a serious problem in Jackson Lake, particularly in the South River arm which is now so shallow that emergent aquatic plants occur in that embayment (Hall, 1975).

B. Rate-Limiting Nutrient:

The algal assay results indicate that the lake was limited by phosphorus at the time the sample was collected (07/01/73). However, the lake data indicate the lake was nitrogen limited

* Table of metric conversions--Appendix A.
* See Appendix B.

at one of the four sampling stations in July, at two of the four stations in September, and at all four stations in November.

C. Nutrient Controllability:

1. Point sources--Point-source contributions amounted to 66.4% of the total phosphorus input to Jackson Lake during the Survey sampling year. This load was from 67 wastewater treatment facilities discharging to the three major streams tributary to the lake (Anonymous, 1972a). However, of the 67 plants, the five major facilities serving the City of Atlanta and DeKalb County and discharging to the South River accounted for 59.8% of the total phosphorus input.

The present phosphorus loading rate of 33.38 $g/m^2/yr$ is 19 times that proposed by Vollenweider (Vollenweider and Dillon, 1974) as a eutrophic rate (see page 18).

The Georgia Water Quality Control Board has recently instituted an effluent limit of 1 mg/l total phosphorus at all major wastewater treatment plants discharging to the South River (Herndon, 1975). On the basis of Survey data (Appendix E), it is calculated that meeting the effluent limit will require the following levels of phosphorus removal at the five major plants:

Atlanta #1 = 88%
#2 = 87%
#3 = 82%
DeKalb Co. #1 = 87%
#2 = 89%

If the above percentages of phosphorus removal are attained, it is calculated that the loading rate will be reduced to 16.23 g/m²/yr, and the total phosphorus input to Jackson Lake will be reduced to 48.6% of the load measured during the sampling year. That step should result in improvement in the trophic condition of Jackson Lake, and the short 31-day hydraulic retention time of the lake should facilitate rapid improvement in water quality.

A 100% reduction of phosphorus at all known point sources would further reduce the loading rate to 11.21 g/m²/year. If this can be accomplished without causing problems elsewhere, the additional reduction would be highly desirable. In this regard, it is noted that consideration has been given to diversion of the wastewater now treated in the three Atlanta metro plants to other Atlanta plants in the Chattahoochee River drainage (Franzmathes, 1974).

The diversion would reduce the phosphorus load to Jackson Lake by 40% and result in at least some improvement in the trophic condition of the lake. However, if the diverted wastes are not treated to remove phosphorus, about 257,000 kg of phosphorus per year will be added to an already excessive phosphorus load to West Point Reservoir*, a new impoundment of the Chattahoochee River. Even if an effluent limit of 1 mg/l total phosphorus is applied to the

* See Working Paper No. 282, "Report on Lake Harding".

wastes diverted to the Chattahoochee River, it is calculated that about 39,000 kg of phosphorus per year will be added to the West Point Reservoir load. Since that load is already excessive, any amount of added phosphorus will be too much; and the trade-off would seem to be of questionable merit in either case.

All of the five major wastewater treatment plants are located more than 32 kilometers from Jackson Lake, and in estimating the nutrient contributions from these sources, no allowance was made for sedimentation of phosphorus or nitrogen into the stream bed or assimilation by periphyton between the discharge points and the lake. However, the relative concentrations of phosphorus present in the South, Yellow, and Alcovy River during the Survey sampling year indicate that the South River carried a much larger load of total phosphorus - by a factor of nearly five and greater - than did the other two rivers which received much smaller wastewater inputs.

No direct estimates were made of the nutrient contribution of storm-water runoff from Atlanta metropolitan areas which would eventually reach Jackson Lake. However, nutrient loads at station B-1 would include this source and be reflected in the loading. Weibel (1969) stated that "...urban storm-water runoff itself,

without any sewage, may contain annually quantities of the same contaminants, amounting to more than 3 percent of those of raw sewage". A contribution of that magnitude would not change the conclusion regarding the need for point-source phosphorus control presented in this report.

A second consideration regarding storm water drainage is that phosphorus would be more likely to be bound to particulate matter and therefore less available for algal assimilation, whereas most of the phosphorus discharged from municipal treatment facilities is in a soluble form.

2. Non-point sources--The phosphorus contribution of non-point sources, including precipitation, amounted to 33.5% of the total load during the sampling year. The South and Yellow rivers contributed 25.6% and 5.8% of this load, respectively. Collectively, the remaining three tributaries contributed 1.7% of the total phosphorus input. Ungaged tributaries were estimated to have contributed 0.3% of the total phosphorus load.

The South River had a phosphorus export rate of 117 kg/km^2/year (see page 18). This is very high compared to the other Jackson Lake tributaries as well as some of the tributaries of Allatoona Reservoir* and Lake Sidney Lanier**; e.g., Shoal Creek (15 kg/km^2/yr), Little River (39 kg/km^2/yr), Chestatee River (46 kg/km^2/yr), and Wahoo Creek (60 kg/km^2/yr). It is believed this high export rate was due to urban drainage and the by-passing

* Working Paper No. 281.
* Working Paper No. 293.

of wastewater treatment plants which is reported to occur during rain storms (Hall, 1975).

Several excellent reports have been published by the Georgia Water Control Board and the Georgia Department of Natural Resources (see "Literature Reviewed", page 19), and these are concerned with water quality in Jackson Lake or in the tributaries to it (refer to these reports for detailed information).

II. LAKE AND DRAINAGE BASIN CHARACTERISTICS

A. Lake Morphometry†:

1. Surface area: 19.22 kilometers^2.
2. Mean depth: 6.9 meters.
3. Maximum depth: >26.8 meters.
4. Volume: 132.618 x 10^6 m^3.
5. Mean hydraulic retention time: 31 days (probably less now because of heavy siltation; Hall, 1973).

B. Tributary and Outlet:
(See Appendix C for flow data)

1. Tributaries -

Name	Drainage area (km^2)*	Mean flow (m^3/sec)*
Tussahaw Creek	186.5	2.6
South River	1,409.0	20.5
Yellow River	1,160.3	15.2
Alcovy River	660.4	8.6
Bear Creek	77.7	1.1
Minor tributaries & immediate drainage -	114.0	1.6
Totals	3,607.9	49.6

2. Outlet -

Ocmulgee River	3,627.1**	49.6

C. Precipitation***:

1. Year of sampling: 154.8 centimeters.
2. Mean annual: 120.0 centimeters.

† Hall, 1973.
* For limits of accuracy, see Working Paper No. 175, "...Survey Methods, 1973-1976".
** Total area adjusted to equal sum of the subdrainage areas plus the area of the lake.
*** See Working Paper No. 175.

III. LAKE WATER QUALITY SUMMARY

Jackson Lake was sampled three times during the open-water season of 1973 by means of a pontoon-equipped Huey helicopter. Each time, samples for physical and chemical parameters were collected from four stations on the lake and from a number of depths at each station (see map, page v). During each visit, a single depth-integrated (4.6 m or near bottom to surface) sample was composited from the stations for phytoplankton identification and enumeration; and during the first visit, a single 18.9-liter depth-integrated sample was composited for algal assays. Also each time, a depth-integrated sample was collected from each of the stations for chlorophyll a analysis. The maximum depths sampled were 26.8 meters at station 1, 10.4 meters at station 2, 4.6 meters at station 3, and 6.1 meters at station 4.

The results obtained are presented in full in Appendix D and are summarized in the following table.

A. SUMMARY OF PHYSICAL AND CHEMICAL CHARACTERISTICS FOR JACKSON LAKE
STORET CODE 1309

PARAMETER	1ST SAMPLING (7/ 1/73) 4 SITES RANGE	MEAN	MEDIAN	2ND SAMPLING (9/ 8/73) 4 SITES RANGE	MEAN	MEDIAN	3RD SAMPLING (11/13/73) 5 SITES RANGE	MEAN	MEDIAN
TEMP (C)	10.1 - 31.3	25.1	25.7	10.3 - 29.7	25.2	27.3	8.3 - 15.6	13.4	14.6
DISS OXY (MG/L)	0.2 - 12.7	5.4	4.4	0.3 - 11.9	4.4	3.0	0.0 - 10.4	7.3	8.8
CNDCTVY (MCROMO)	50. - 140.	71.	68.	63. - 168.	90.	81.	44. - 208.	71.	62.
PH (STAND UNITS)	6.6 - 10.1	7.9	6.9	6.2 - 9.2	7.3	7.0	6.5 - 7.3	6.8	6.8
TOT ALK (MG/L)	15. - 57.	21.	20.	21. - 66.	27.	24.	19. - 82.	27.	23.
TOT P (MG/L)	0.031 - 0.320	0.097	0.072	0.036 - 2.160	0.352	0.069	0.044 - 1.200	0.247	0.166
ORTHO P (MG/L)	0.003 - 0.180	0.039	0.014	0.011 - 0.580	0.112	0.019	0.013 - 0.954	0.156	0.116
NO2+NO3 (MG/L)	0.080 - 0.760	0.305	0.225	0.040 - 1.690	0.332	0.070	0.040 - 1.940	0.486	0.410
AMMONIA (MG/L)	0.090 - 4.200	0.431	0.150	0.050 - 6.290	0.742	0.155	0.040 - 2.450	0.347	0.090
KJEL N (MG/L)	0.200 - 4.600	0.815	0.500	0.500 - 8.100	1.521	0.950	0.400 -13.700	1.479	0.600
INORG N (MG/L)	0.190 - 4.320	0.736	0.575	0.110 - 6.350	1.074	0.365	0.100 - 2.570	0.833	0.550
TOTAL N (MG/L)	0.510 - 4.720	1.120	0.880	0.580 - 8.160	1.854	1.200	0.660 -13.740	1.965	0.980
CHLRPYL A (UG/L)	10.3 - 20.5	13.8	12.2	8.3 - 41.3	21.4	18.0	2.2 - 16.2	9.7	13.0
SECCHI (METERS)	0.8 - 1.0	0.9	0.9	0.8 - 1.2	1.0	1.0	0.9 - 1.4	1.0	1.0

B. Biological characteristics:

1. Phytoplankton -

Sampling Date	Dominant Genera	Algal units per ml
07/01/73	1. Microcystis	382
	2. Oscillatoria	376
	3. Pennate diatoms	361
	4. Anabaena	302
	5. Scenedesmus	155
	Other genera	515
	Total	2,091
09/08/73	1. Raphidiopsis	17,771
	2. Microcystis	2,399
	3. Anabaenopsis	1,955
	4. Merismopedia	711
	5. Lyngbya	444
	Other genera	2,755
	Total	26,035
11/13/73	1. Merismopedia	662
	2. Microcystis	639
	3. Ankistrodesmus	388
	4. Cryptomonas	297
	5. Coccoid green cells	274
	Other genera	1,074
	Total	3,334

2. Chlorophyll *a* -

Sampling Date	Station Number	Chlorophyll *a* (µg/l)
07/01/73	01	10.3
	02	13.0
	03	20.5
	04	11.4
09/08//3	01	18.1
	02	8.3
	03	41.3
	04	17.9
11/13/73	01	2.3
	02	13.0
	03	2.2
	04	16.2

C. Limiting Nutrient Study:

A depth-integrated sample was collected from each of the four Jackson Lake sampling sites on July 1, 1973, and the four sub-samples were combined into one sample for algal assay analyses.

1. Autoclaved, filtered, and nutrient spiked -

Spike (mg/l)	Ortho P Conc. (mg/l)	Inorganic N Conc. (mg/l)	Maximum yield (mg/l-dry wt.)
Control	0.026	0.660	18.8
0.010 P	0.036	0.660	17.9
0.020 P	0.046	0.660	18.5
0.050 P	0.076	0.660	20.7
0.025 P + 0.5 N	0.051	1.160	26.4
0.050 P + 1.0 N	0.076	1.660	36.7
1.0 N	0.026	1.660	19.8

2. Filtered and nutrient spiked -

Spike (mg/l)	Ortho P Conc. (mg/l)	Inorganic N Conc. (mg/l)	Maximum yield (mg/l-dry wt.)
Control	0.019	0.930	11.9
0.010 P	0.029	0.930	14.0
0.020 P	0.039	0.930	16.5
0.050 P	0.069	0.930	17.4
0.025 P + 0.5 N	0.044	1.430	23.1
0.050 P + 1.0 N	0.069	1.930	34.4
1.0 N	0.019	1.930	12.1

3. Discussion -

The control yields of the assay alga, Selenastrum capricornutum, show that Jackson Lake is presently capable of supporting high levels of primary production (18.8 mg/l and 11.9 mg/l).

In the autoclaved-filtered sample, a significant increase in yield did not result with the addition of nitrogen or phosphorus alone, but the greatest yield occurred when nitrogen and phosphorus were added together.

In the filtered-only sample, a significant increase in cell yield occurred when phosphorus alone was added; in other words, a phosphorus-limited condition was demonstrated.

These algal assay data and the lake data indicate primary production in Jackson Lake can be controlled by limiting phosphorus inputs.

The lake data indicate a temporal and spatial combination of limiting nutrients. It will be noted that the stations nearest the point sources (stations 3 and 4; see map, page v) tended to be nitrogen limited, while the stations further away tended to be phosphorus limited.

Following is a tabulation of mean inorganic nitrogen to orthophosphorus ratios for each of the stations and sampling times with the indicated limiting nutrient in parentheses.

Station	07/01/73	09/08/73	11/13/73
01	38/1 (P)	51/1 (P)	12/1 (N)
02	48/1 (P)	23/1 (P)	10/1 (N)
03	5/1 (N)	3/1 (N)	5/1 (N)
04	40/1 (P)	7/1 (N)	7/1 (N)

Nitrogen limitation, as indicated by in-lake nitrogen to phosphorus ratios, does not necessarily suggest that the trophic condition of the lake can be improved by controlling nitrogen inputs. The apparent condition of nitrogen-limitation in Jackson Lake resulted from excessive point-source phosphorus inputs to the South River arm (station 3), and to a lesser extent, to the Alcovy River arm (station 4). The reversal of the enriched condition, therefore, depends upon phosphorus control, not nitrogen control.

IV. NUTRIENT LOADINGS
(See Appendix E for data)

For the determination of nutrient loadings, the Georgia National Guard collected monthly near-surface grab samples from each of the tributary sites indicated on the map (page v), except for the high runoff months of January and February when two samples were collected. Sampling was begun in March, 1973, and was completed in February, 1974.

Through an interagency agreement, stream flow estimates for the year of sampling and a "normalized" or average year were provided by the Georgia District Office of the U.S. Geological Survey for the tributary sites nearest the lake.

In this report, nutrient loads for sampled tributaries were determined by using a modification of a U.S. Geological Survey computer program for calculating stream loadings*. Nutrient loads shown are those measured minus point-source loads, if any.

Nutrient loads for unsampled "minor tributaries and immediate drainage" ("ZZ" of U.S.G.S.) were estimated using the means of the nutrient loads, in $kg/km^2/year$, at stations A-1 and G-1 and multiplying the means by the ZZ area in km^2.

The operators of the DeKalb County #1 and #2; City of Atlanta #1, #2, and #3; Covington; and Monroe wastewater treatment plants provided monthly effluent samples and corresponding flow data.

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* See Working Paper No. 175.

A. Waste Sources:

1. Known muncipal -

Name	Pop. Served*	Treatment	Mean Flow (m^3/d)	Receiving Water
DeKalb Co. #1, Snapfinger Creek	12,000	trickling filter	29,935.6**	Snapfinger Creek to South River
DeKalb Co. #2, Shoal Creek	37,000	trickling filter	13,561.7	Shoal Creek to South River
Atlanta #1, South River (old)	44,000	trickling filter	11,014.4	South River
Atlanta #2, South River (new)	112,000	trickling filter	40,083.2	South River
Atlanta #3, Intrenchment Creek	149,000	trickling filter	55,177.7	Intrenchment Creek to South River
Covington	10,400	trickling filter	5,450.4	Dried Indian Creek to Yellow River
Monroe	6,000	stab. pond	3,974.2**	Alcovy River

2. Known industrial† - Eighteen small facilities with a total design flow of 13,000 m^3/d discharge to the South River, 38 small facilities with a total design flow of 16,700 m^3/d discharge to the Yellow River, and six small facilities with a total volume of 5,700 m^3/d discharge to the Alcovy River.

These facilities treat mostly domestic type wastes.

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* STP operator questionnaires.
** More than 25% of total waste load to plant is contributed by industry.
† Anonymous, 1972a.

B. Annual Total Phosphorus Loading - Average Year:

1. Inputs -

Source	kg P/ yr	% of total
a. Tributaries (non-point load) -		
Tussahaw Creek	2,505	0.4
South River	164,435	25.6
Yellow River	37,395	5.8
Alcovy River	6,540	1.0
Bear Creek	1,770	0.3
b. Minor tributaries & immediate drainage (non-point load) -	2,065	0.3
c. Known municipal STP's -		
DeKalb Co. #1	81,660	12.7
DeKalb Co. #2	44,855	7.0
Atlanta #1	34,930	5.4
Atlanta #2	111,450	17.4
Atlanta #3	110,795	17.3
Covington	33,930	5.3
Monroe	8,385	1.3
d. Septic tanks* -	415	0.1
e. Industrial - Unknown	?	-
f. Direct precipitation** -	340	0.1
Total	641,470	100.0

2. Outputs -

Lake outlet - Ocmulgee River 237,520

3. Net annual P accumulation - 403,950 kg.

* Estimate based on 1,462 lakeshore dwellings; see Working Paper No. 175.
** See Working Paper No. 175.

C. Annual Total Nitrogen Loading - Average Year:

1. Inputs -

Source	kg N/ yr	% of total
a. Tributaries (non-point load) -		
Tussahaw Creek	56,015	2.4
South River	663,150	28.1
Yellow River	367,590	15.6
Alcovy River	210,305	8.9
Bear Creek	31,485	1.3
b. Minor tributaries & immediate drainage (non-point load) -	40,220	1.7
c. Known municipal STP's -		
DeKalb Co. #1	247,150	10.5
DeKalb Co. #2	80,745	3.4
Atlanta #1	76,795	3.3
Atlanta #2	214,120	9.1
Atlanta #3	290,400	12.3
Covington	22,000	0.9
Monroe	21,800	0.9
d. Septic tanks* -	15,580	0.7
e. Industrial - Unknown	?	-
f. Direct precipitation** -	20,750	0.9
Total	2,358,105	100.0

2. Outputs -

Lake outlet - Ocmulgee River 1,586,280

3. Net annual N accumulation - 771,825 kg.

* Estimate based on 1,462 lakeshore dwellings; see Working Paper No. 175.
** See Working Paper No. 175.

D. Mean Annual Non-point Nutrient Export by Subdrainage Area:

Tributary	kg P/km²/yr	kg N/km²/yr
Tussahaw Creek	13	300
South River	117	471
Yellow River	32	317
Alcovy River	10	318
Bear Creek	23	405

E. Yearly Loading Rates:

In the following table, the existing phosphorus loading rates are compared to those proposed by Vollenweider (Vollenweider and Dillon, 1974). Essentially, his "dangerous" rate is the rate at which the receiving water would become eutrophic or remain eutrophic; his "permissible" rate is that which would result in the receiving water remaining oligotrophic or becoming oligotrophic if morphometry permitted. A mesotrophic rate would be considered one between "dangerous" and "permissible".

Note that Vollenweider's model may not be applicable to water bodies with short hydraulic retention times.

	Total Phosphorus		Total Nitrogen	
	Total	Accumulated	Total	Accumulated
grams/m²/yr	33.38	21.02	122.7	40.2

Vollenweider loading rates for phosphorus (g/m²/yr) based on mean depth and mean hydraulic retention time of Jackson Lake:

"Dangerous" (eutrophic rate)	1.72
"Permissible" (oligotrophic rate)	0.86

V. LITERATURE REVIEWED

Anonymous, 1971. Upper Ocmulgee River basin water quality survey. GA Water Qual. Contr. Board, Atlanta.

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Anonymous, 1972b. Ocmulgee River basin study. GA Dept. of Nat. Resources, Atlanta.

Anonymous, 1972c. Water quality data - Atlanta area; Chattahoochee, Flint, and South rivers, 1970 and 1971. GA Water Qual. Contr. Board, Atlanta.

Carrick, Louis B., and Edward T. Hall, Jr., 1969. A water quality survey of Jackson Lake upper reservoir, Georgia. GA Dept. of Nat. Resources, Atlanta.

Franzmathes, Joseph R., 1974. Personal communication (proposed diversion of Atlanta metro wastes). Water Division, EPA Region IV, Atlanta.

Hall, Edward T., Jr., 1973. Personal communication (lake morphometry; water quality in Jackson Lake). GA Dept. of Nat. Resources, Atlanta.

_____, 1975. Personal communication (review of preliminary report on Jackson Lake). GA Dept. of Nat. Resources, Atlanta.

Herndon, Albert B., 1975. Personal communication (effluent phosphorus limits - South River drainage). Water Division, EPA Region IV, Atlanta.

Ketelle, Martha J., and Paul D. Uttormark, 1971. Problem lakes in the United States. EPA Water Poll. Contr. Res. Ser., Proj. #16010 EHR, Wash., DC.

Vollenweider, R. A., and P. J. Dillon, 1974. The application of the phosphorus loading concept to eutrophication research. Natl. Res. Council of Canada Publ. No. 13690, Canada Centre for Inland Waters, Burlington, Ontario.

Weibel, S. R., 1969. Urban Drainage as a Factor in Eutrophication. In: Eutrophication: Causes, Consequences, Correctives. Natl. Acad. Sci., Wash., DC., p. 383-403.

CONVERSION FACTORS

Hectares x 2.471 = acres

Kilometers x 0.6214 = miles

Meters x 3.281 = feet

Cubic meters x 8.107×10^{-4} = acre/feet

Square kilometers x 0.3861 = square miles

Cubic meters/sec x 35.315 = cubic feet/sec

Centimeters x 0.3937 = inches

Kilograms x 2.205 = pounds

Kilograms/square kilometer x 5.711 = lbs/square mile

LAKES RANKED BY INDEX NOS.

RANK	LAKE CODE	LAKE NAME	INDEX NO
1	1316	BLUE RIDGE LAKE	524
2	1318	BURTON LAKE	523
3	1303	CHATUGE LAKE	424
4	1311	NOTTELY RESERVOIR	393
5	1310	LAKE SIDNEY LANIER	385
6	1304	CLARK HILL RESERVOIR	309
7	1301	ALLATOONA RESERVOIR	286
8	1302	BLACKSHEAR LAKE	284
9	1313	SINCLAIR LAKE	254
10	1312	LAKE SEMINOLE	253
11	1319	HIGH FALLS LAKE	192
12	1314	LAKE EUFAULA	184
13	1309	JACKSON LAKE	116
14	1317	LAKE HARDING	77

PERCENT OF LAKES WITH HIGHER VALUES (NUMBER OF LAKES WIT.. HIGHER VALUES)

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500-MEAN SEC	MEAN CHLORA	15-MIN DO	MEDIAN DISS P	INDEX NO
1301	ALLATOONA RESERVOIR	62 (8)	54 (7)	46 (6)	31 (4)	31 (0)	62 (7)	286
1302	BLACKSHEAR LAKE	38 (5)	31 (4)	0 (0)	100 (13)	100 (13)	15 (2)	284
1303	CHATUGE LAKE	85 (11)	85 (11)	92 (12)	69 (9)	31 (0)	62 (7)	424
1304	CLARK HILL RESERVOIR	54 (7)	62 (8)	62 (8)	54 (7)	31 (0)	46 (6)	309
1309	JACKSON LAKE	8 (1)	8 (1)	15 (2)	8 (1)	69 (9)	8 (1)	116
1310	LAKE SIDNEY LANIER	69 (9)	46 (6)	77 (10)	77 (10)	31 (0)	85 (10)	385
1311	NOTTELY RESERVOIR	77 (10)	69 (9)	69 (9)	62 (8)	31 (0)	85 (10)	393
1312	LAKE SEMINOLE	31 (4)	15 (2)	38 (5)	46 (6)	92 (12)	31 (4)	253
1313	SINCLAIR LAKE	46 (6)	38 (5)	54 (7)	23 (3)	31 (0)	62 (7)	254
1314	LAKE EUFAULA	15 (2)	23 (3)	31 (4)	15 (2)	77 (10)	23 (3)	184
1316	BLUE RIDGE LAKE	92 (12)	92 (12)	85 (11)	85 (11)	85 (11)	85 (10)	524
1317	LAKE HARDING	0 (0)	0 (0)	8 (1)	38 (5)	31 (0)	0 (0)	77
1318	BURTON LAKE	100 (13)	100 (13)	100 (13)	92 (12)	31 (0)	100 (13)	523
1319	HIGH FALLS LAKE	23 (3)	77 (10)	23 (3)	0 (0)	31 (0)	38 (5)	192

LAKE DATA TO BE USED IN RANKINGS

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500-MEAN SEC	MEAN CHLORA	15-MIN DO	MEDIAN DISS P
1301	ALLATOONA RESERVOIR	0.020	0.150	443.167	7.489	14.900	0.005
1302	BLACKSHEAR LAKE	0.035	0.250	468.091	1.855	11.700	0.014
1303	CHATUGE LAKE	0.014	0.110	382.778	6.339	14.900	0.005
1304	CLARK HILL RESERVOIR	0.024	0.150	439.250	6.715	14.900	0.007
1309	JACKSON LAKE	0.094	0.530	461.385	14.577	14.800	0.027
1310	LAKE SIDNEY LANIER	0.016	0.180	396.417	5.431	14.900	0.004
1311	NOTTELY RESERVOIR	0.015	0.130	405.667	6.656	14.900	0.004
1312	LAKE SEMINOLE	0.040	0.405	456.133	6.760	11.800	0.010
1313	SINCLAIR LAKE	0.028	0.230	440.667	8.006	14.900	0.005
1314	LAKE EUFAULA	0.048	0.345	457.667	9.083	14.400	0.011
1316	BLUE RIDGE LAKE	0.010	0.105	394.889	3.078	13.000	0.004
1317	LAKE HARDING	0.114	0.640	467.538	7.438	14.900	0.045
1318	BURTON LAKE	0.007	0.100	363.889	2.733	14.900	0.003
1319	HIGH FALLS LAKE	0.047	0.115	459.444	15.075	14.900	0.009

TRIBUTARY FLOW INFORMATION FOR GEORGIA 01/06/76

LAKE CODE 1309 JACKSON LAKE

TOTAL DRAINAGE AREA OF LAKE(SQ KM) 3626.0

TRIBUTARY	SUB-DRAINAGE AREA(SQ KM)	NORMALIZED FLOWS(CMS) JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN
1309A1	186.5	3.71	4.30	5.04	4.25	2.61	1.81	1.76	1.13	1.02	1.08	1.95	2.46	2.58
1309B1	1409.0	28.32	32.85	38.51	32.85	20.53	15.01	14.16	10.05	9.34	9.63	16.14	19.82	20.52
1309C1	1160.3	21.80	25.20	30.30	25.34	15.29	10.76	9.77	6.65	5.95	6.09	11.47	14.30	15.18
1309D1	3626.0	69.94	81.27	96.84	81.27	49.84	35.68	32.85	22.80	20.53	21.38	37.94	47.57	49.63
1309E1	660.4	12.32	14.44	17.56	14.44	8.64	6.09	5.52	3.82	3.17	3.51	6.51	8.35	8.66
1309G1	77.7	1.53	1.81	2.41	1.78	1.08	0.76	0.71	0.45	0.42	0.42	0.82	1.02	1.10
1309ZZ	114.0	2.27	2.6[illegible]	3.03	2.61	1.56	1.10	1.08	0.68	0.62	0.65	1.19	1.47	1.57

SUMMARY

TOTAL DRAINAGE AREA OF LAKE = 3626.0
SUM OF SUB-DRAINAGE AREAS = 3607.9

TOTAL FLOW IN = 597.76
TOTAL FLOW OUT = 597.91

NOTE *** LAKE AREA=7 SQ MI, NOT INCLUDED IN SUM OF SUB-DRAINAGE AREA

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW
1309A1	3	73	5.61	10	3.26		
	4	73	8.07	14	2.35		
	5	73	3.91	5	1.61		
	6	73	1.98	4	2.35		
	7	73	1.78	14	1.67		
	8	73	2.18	10	2.10		
	9	73	1.33	10	0.71		
	10	73	0.65	13	0.71		
	11	73	1.30	4	0.79		
	12	73	1.81	9	1.87		
	1	74	11.41	11	2.49	22	7.08
	2	74	9.88	8	14.72	21	4.11
1309B1	3	73	45.02	10	35.40		
	4	73	67.96	14	45.02		
	5	73	37.38	5	29.73		
	6	73	28.60	4	35.96		
	7	73	12.63	14	12.46		
	8	73	14.53	11	12.46		
	9	73	10.34	10	7.79		
	10	73	13.76	13	8.95		
	11	73	9.85	4	9.46		
	12	73	19.82	9	13.71		
	1	74	50.12	11	24.44	22	33.70
	2	74	45.87	8	64.85	21	40.78

TRIBUTARY FLOW INFORMATION FOR GEORGIA 01/06/76

LAKE CODE 1309 JACKSON LAKE

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
1309C1	3	73	35.57	10	27.35				
	4	73	54.09	14	35.40				
	5	73	29.45	5	22.82				
	6	73	22.29	4	27.89				
	7	73	8.83	14	8.50				
	8	73	10.00	11	8.58				
	9	73	7.05	10	4.67				
	10	73	8.98	13	5.61				
	11	73	6.46	4	6.03				
	12	73	13.96	9	9.51				
	1	74	39.36	11	18.35	22	25.91		
	2	74	35.40	8	51.54	21	32.00		
1309D1	3	73	116.10	10	65.70				
	4	73	168.77	14	156.03				
	5	73	91.46	5	32.00				
	6	73	68.53	4	82.69				
	7	73	33.98	14	16.42				
	8	73	29.73	11	34.26				
	9	73	18.97	10	12.74				
	10	73	35.68	13	16.42				
	11	73	21.52	4	16.42				
	12	73	41.06	9	25.20				
	1	74	130.82	11	87.50	22	84.95		
	2	74	124.03	8	193.97	21	112.42		
1309E1	3	73	21.61	10	15.57				
	4	73	30.87	14	20.10				
	5	73	16.71	5	13.00				
	6	73	12.60	4	15.89				
	7	73	5.01	14	4.84				
	8	73	5.72	11	4.87				
	9	73	3.77	10	2.66				
	10	73	5.18	13	3.20				
	11	73	3.68	4	3.43				
	12	73	8.16	9	5.44				
	1	74	22.20	11	10.48	22	14.78		
	2	74	20.33	8	29.45	21	18.21		
1309G1	3	73	2.66	10	1.27				
	4	73	3.40	14	0.88				
	5	73	1.61	5	0.57				
	6	73	0.85	4	0.88				
	7	73	0.74	14	0.59				
	8	73	0.88	11	0.59				
	9	73	0.26	10	0.22				
	10	73	0.26	13	0.22				
	11	73	0.54	4	0.25				
	12	73	0.74	9	0.68				
	1	74	4.70	11	0.96	22	2.75		
	2	74	4.16	8	6.51	21	1.42		

TRIBUTARY FLOW INFORMATION FOR GEORGIA 01/06/76

LAKE CODE 1309 JACKSON LAKE

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
1309ZZ	3	73	3.37						
	4	73	4.96						
	5	73	2.32						
	6	73	1.22						
	7	73	1.08						
	8	73	1.30						
	9	73	0.79						
	10	73	0.40						
	11	73	0.79						
	12	73	1.10						
	1	74	6.99						
	2	74	6.12						

APPENDIX D.

PHYSICAL and CHEMICAL DATA

STORET RETRIEVAL DATE 74/11/26

130901
33 19 18.0 083 50 28.0
JACKSON LAKE
13159 GEORGIA

11EPALES
3

2111202
0090 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/07/01	16 00	0000	31.3		36	80	10.10	19	0.150	0.700	0.100	0.011
	16 00	0006	27.8	9.4		70	9.70	21	0.110	0.800	0.120	0.024
	16 00	0015	24.9	2.9		80	6.90	23	0.270	0.500	0.760	0.097
	16 00	0030	23.8	1.8		72	6.70	23	0.270	0.600	0.680	0.052
	16 00	0050	21.2	0.3		65	6.70	24	0.600	0.700	0.150	0.015
	16 00	0070	12.0	0.2		55	6.60	23	0.890	1.300	0.080	0.020
	16 00	0086	10.1	0.4		140	7.10	57	4.200	4.600	0.120	0.003
73/09/08	11 15	0000	28.8	9.0	38	82	8.90	23	0.060	1.100	0.050	0.014
	11 15	0015	27.5	1.0		80	7.20	24	0.170	0.600	0.210	0.052
	11 15	0040	24.8	1.0		97	6.70	30	0.560	1.100	0.480	0.097
	11 15	0065	12.3	1.0		72	6.40	26	1.660	2.400	0.060	0.015
	11 15	0088	10.3	1.0		168	6.40	66	6.290	8.100	0.060	0.011
73/11/13	12 15	0000	15.4		54	70	6.70	22	0.200	0.600	0.560	0.127
	12 15	0005	15.3	7.8		70	6.70	21	0.200	0.400	0.570	0.124
	12 15	0015	15.3	7.0		71	6.50	21	0.330	0.400	0.580	0.133
	12 15	0030	14.9	3.0		78	6.50	25	0.560	0.700	0.730	0.179
	12 15	0055	13.5	0.8		83	6.50	39	2.450	2.900	0.080	0.030
	12 15	0091	10.8	0.0		208	6.50	82	1.010	13.700	0.040	0.013

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/07/01	16 00	0000	0.083	10.3
	16 00	0006	0.094	
	16 00	0015	0.142	
	16 00	0030	0.103	
	16 00	0050	0.058	
	16 00	0070	0.045	
	16 00	0086	0.057	
73/09/08	11 15	0000	0.048	18.1
	11 15	0015	0.089	
	11 15	0040	0.184	
	11 15	0065	0.161	
	11 15	0088	0.188	
73/11/13	12 15	0000	0.166	2.3
	12 15	0005	0.157	
	12 15	0015	0.166	
	12 15	0030	0.263	
	12 15	0055	0.104	
	12 15	0091	0.370	

STORET RETRIEVAL DATE 74/11/26

130902
33 21 12.0 083 53 12.0
JACKSON LAKE
13035 GEORGIA

11EPALES 2111202
3 0038 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/07/01	16 40	0000	29.5		30	75	10.00	19	0.180	1.000	0.120	0.007
	16 40	0006	27.9	9.3		60	9.50	16	0.130	0.500	0.120	0.010
	16 40	0015	25.2	1.6		60	6.80	20	0.230	0.500	0.410	0.014
	16 40	0025	24.2	1.3		60	6.70	21	0.280	0.400	0.370	0.014
	16 40	0034	23.5	2.4		55	6.70	22	0.380	0.500	0.240	0.006
73/09/08	13 55	0000	29.4	6.2	48	74	8.40	22	0.070	1.600	0.050	0.014
	13 55	0007	28.4	3.9		72	7.00	21	0.090	0.800	0.050	0.011
	13 55	0015	26.7	0.3		67	6.50	22	0.270	0.700	0.080	0.015
	13 55	0027	25.5	1.0		82	6.20	27	0.650	1.200	0.040	0.016
73/11/13	12 40	0000	14.8		39	61	6.90	20	0.090	1.400	0.360	0.050
	12 40	0005	14.7	9.2		60	6.60	20	0.080	0.600	0.380	0.054
	12 40	0015	14.6	7.8		60	6.60	23	0.080	0.400	0.350	0.043
	12 40	0022	14.4	8.0		58	6.70	24	0.070	0.400	0.300	0.029

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/07/01	16 40	0000	0.074	13.0
	16 40	0006	0.054	
	16 40	0015	0.036	
	16 40	0025	0.040	
	16 40	0034	0.032	
73/09/08	13 55	0000	0.036	8.3
	13 55	0007	0.041	
	13 55	0015	0.049	
	13 55	0027	0.048	
73/11/13	12 40	0000	0.117	13.0
	12 40	0005	0.103	
	12 40	0015	0.088	
	12 40	0022	0.072	

STORET RETRIEVAL DATE 74/11/26

130903
33 23 05.0 083 52 40.0
JACKSON LAKE
13035 GEORGIA

11EPALES
3

2111202
0019 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/07/01	15	35 0000	29.9	12.4	34	85	10.00	15	0.090	1.700	0.140	0.065
	15	35 0005	28.8	11.8		62	8.80	15	0.100	0.400	0.430	0.137
	15	35 0010	27.0	9.8		80	8.30	20	0.110	0.300	0.720	0.180
	15	35 0015	24.5	6.9		70	6.90	19	0.150	0.400	0.630	0.092
73/09/08	14	30 0000	29.7	11.9	33	103	9.20	24	0.070	1.000	0.160	0.138
	14	30 0007	28.0	8.0		106	7.20	28	0.140	0.800	1.580	0.580
	14	30 0012	25.2	5.4		121	6.70	27	0.160	0.500	1.690	0.550
73/11/13	13	28 0000	8.3		38	44	6.80	27	0.320	0.900	0.970	0.472
	13	28 0001	8.3	10.4		44						
	13	28 0008	8.4	9.0		98	6.80	31	0.630	1.300	1.940	0.954

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/07/01	15	35 0000	0.173	20.5
	15	35 0005	0.202	
	15	35 0010	0.329	
	15	35 0015	0.197	
73/09/08	14	30 0000	0.252	41.3
	14	30 0007	1.580	
	14	30 0012	2.160	
73/11/13	13	28 0000	0.718	2.2
	13	28 0008	1.200	

STORET RETRIEVAL DATE 74/11/26

130904
33 23 32.0 083 49 58.0
JACKSON LAKE
13217 GEORGIA

11EPALES
3

2111202
0022 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/07/01	16	25 0000	31.2	12.7	40	78	10.00	15	0.090	0.600	0.100	0.013
	16	25 0005	27.5	4.6		60	7.00	16	0.120	0.300	0.210	0.007
	16	25 0015	26.2	4.2		58	6.90	17	0.120	0.300	0.270	0.006
	16	25 0020	25.0	4.8		50K	6.90	19	0.150	0.200K	0.330	0.009
73/09/08	14	55 0000	29.2	10.0	37	77	9.00	21	0.050	0.900	0.060	0.027
	14	55 0015	27.1	2.1		63	7.00	21	0.150	0.500	0.080	0.023
73/11/13	13	12 0000	15.1		36	50	7.30	21	0.050	0.700	0.140	0.025
	13	12 0005	14.6	10.0		51	7.20	19	0.060	0.600	0.130	0.022
	13	12 0014	14.1	9.6		49	7.20	21	0.040	0.600	0.060	0.018

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/07/01	16	25 0000	0.071	11.4
	16	25 0005	0.043	
	16	25 0015	0.044	
	16	25 0020	0.031	
73/09/08	14	55 0000	0.044	17.3
	14	55 0015	0.047	
73/11/13	13	12 0000	0.042	14.2
	13	12 0005	0.076	
	13	12 0014	0.044	

K VALUE KNOWN TO BE
LESS THAN INDICATED

APPENDIX E

TRIBUTARY and WASTEWATER TREATMENT PLANT DATA

STORET RETRIEVAL DATE 76/01/06

1309A1 1309A1
33 22 00.0 083 55 00.0
TUSSAHAW CREEK
13 7.5 JACKSON
T/JACKSON LAKE
RT 36 BRDG S OF WORTHVILLE
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/10	15 55		0.231	1.150	0.077	0.007	0.020
73/04/14	14 30		0.210	0.560	0.082	0.005K	0.020
73/05/05	09 15		0.250	1.380	0.210		0.020
73/06/04	08 30		0.280	0.480	0.042	0.008	0.020
73/07/14	11 00		0.010K	0.340	0.007	0.005K	0.025
73/08/10	09 15		0.189	0.300	0.037	0.005K	0.070
73/10/13	13 25		0.011	0.675	0.014	0.008	0.025
73/11/04	09 27		0.126	1.050	0.092	0.005K	0.040
73/12/09	10 08		0.176	0.200	0.036	0.008	0.020
74/01/11	13 00		0.252	0.200	0.027	0.007	0.025
74/01/22	10 17		0.168	0.300	0.030	0.015	0.060
74/02/08	08 30		0.168	0.200	0.030	0.010	0.040
74/02/21	09 15		0.232	0.100K	0.025	0.010	0.025

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/01/06

130981 130981
33 20 15.0 083 57 00.0
S RIVER
13 7.5 WORTHVILLE
1/JACKSON LAKE
SNAPPING SHOALS BRDG
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/10	15 30		0.680	3.780	1.200	0.520	1.320
73/04/14	14 00		0.920	1.680	0.294	0.260	0.420
73/05/05	09 40		0.930	1.800	0.370		0.480
73/06/04	09 00		1.060	0.630	0.073	0.330	0.480
73/07/14	11 27		1.800	0.780	0.170	0.840	0.980
73/08/11	10 10		1.580	0.520	0.198	0.710	0.840
73/09/10	09 45		2.020	0.960	0.460	0.980	1.800
73/10/13	13 47		2.300	1.200	0.460	1.300	1.450
73/11/04	09 46		1.880	1.100	0.336	1.200	1.450
73/12/09	10 27		1.500	1.400	0.520	0.620	0.860
74/01/11	13 15		1.200	0.900	0.290	0.390	0.640
74/01/22	10 37		0.450	0.900	0.055	0.115	0.500
74/02/08	08 50		0.580	0.600	0.065	0.140	0.410
74/02/21	09 35		0.870	0.600	0.080	0.200	0.390

STORET RETRIEVAL DATE 76/01/06

1309C1 1309C1
33 27 45.0 083 53 00.0
YELLOW RIVER
13 7.5 WORTHVILLE
I/JACKSON LAKE
GA HWY 212 BRDG
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/10	15 05		0.340	1.000	0.056	0.067	0.105
73/04/14	14 10		0.294	1.400	0.060	0.039	0.090
73/05/05	10 00		0.320	1.200	0.357		0.110
73/06/04	09 20		0.330	0.110	0.034	0.040	0.165
73/07/14	11 35		0.360	0.150	0.023	0.088	0.135
73/08/11	10 30		0.380	0.100K	0.021	0.110	0.160
73/09/10	10 00		0.290	0.200	0.083	0.120	0.210
73/10/13	14 02		0.360	0.750	0.120	0.420	0.520
73/11/04	10 00		0.260	0.250	0.058	0.128	0.200
73/12/09	10 48		0.340	0.200	0.060	0.088	0.160
74/01/11	13 30		0.410	0.200	0.035	0.065	0.145
74/01/22	10 51		0.312	0.800	0.150		0.245
74/02/08	09 00		0.288	0.300	0.045	0.030	0.145
74/02/21	09 50		0.368	0.200	0.020	0.035	0.100

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/01/06

1309D1 1309D1
33 18 30.0 083 50 00.0
OCMULGEE RIVER
13 7.5 LLOYD SHOALS
0/JACKSON LAKE
RT 16 BRDG BELO LLOYD SHOALS DAM
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/10	16 15		0.540	1.600	0.198	0.105	0.145
73/04/14	15 45		0.273	0.630	0.210	0.050	0.115
73/05/05	11 30		0.390	0.710	0.132		0.125
73/06/04	11 00		0.300	0.580	0.126	0.060	0.108
73/07/14	13 15		0.750	0.360	0.092	0.110	0.150
73/08/11	13 00		0.570	0.420	0.270	0.126	0.170
73/09/10	11 30		0.520	0.310	0.294	0.138	0.195
73/10/13	13 45		0.490	0.550	0.154	0.090	0.135
73/11/04	11 30		0.540	0.700	0.300	0.128	0.190
73/12/09	12 08		0.590	0.600	0.192	0.160	0.220
74/01/11	15 10		0.490	0.400	0.095	0.070	0.145
74/01/22	12 15		0.500	0.900	0.125		0.143
74/02/08	10 30		0.510	0.400	0.095	0.095	0.165
74/02/21	11 15		0.352	0.400	0.055	0.055	0.140

STORET RETRIEVAL DATE 76/01/06

1309E1 1309E1
33 27 00.0 083 49 30.0
ALCOVEY RIVER
13 7.5 STEWART
I/JACKSON LAKE
BRDG ON NEWTON FACTORY BRDG RD
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/10	14	20	0.260	1.980	0.110	0.022	0.035
73/04/14	14	40	0.220	1.260	0.036	0.014	0.035
73/05/05	10	30	0.273	1.150	0.210		0.035
73/06/04	10	00	0.290	0.340	0.028	0.023	0.060
73/07/14	11	50	0.400	0.150	0.020	0.021	0.040
73/08/11	11	10	0.370	0.200	0.025	0.019	0.045
73/09/10	10	40	0.336	0.100K	0.039	0.021	0.060
73/10/13	14	30	0.330	1.000	0.420	0.026	0.115
73/11/04	10	56	0.270	0.225	0.024	0.025	0.050
73/12/09	11	28	0.216	0.300	0.040	0.032	0.065
74/01/11	19	55	0.288	0.200	0.015	0.020	0.045
74/01/22	11	58	0.290	0.600	0.030	0.020	0.070
74/02/08	09	30	0.276	0.300	0.020	0.025	0.075
74/02/21	10	20	0.280	0.100	0.020	0.020	0.040

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/01/06

1309F1 1309F1
33 32 30.0 083 52 30.0
DRIED INDIAN CREEK
13 7.5 COVINGTON
T/JACKSON LAKE
BRDG ON FLAT SHOALS RD NW OF HIGH POINT
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/10	13 45		0.710	1.470	0.730	1.160	1.500
73/04/14	15 20		0.680	2.040	0.710	0.910	1.350
73/05/05	10 40		0.750	1.680	0.760		1.150
73/06/04	10 20		0.800	0.560	0.220	1.370	1.760
73/07/14	12 20		1.000	1.260	0.540	2.600	3.150
73/08/11	11 30		0.560	1.680	0.870	2.300	3.500
73/09/10	11 00		0.357	5.100	3.700	2.500	2.900
73/10/13	14 55		0.310	3.700	2.400	5.200	6.350
73/11/04	10 18		0.250	3.150	1.700	8.600	9.800
73/12/09	11 10		0.450	2.100	1.440	2.000	3.150
74/01/11	13 50		0.710	1.400	0.540	2.200	3.100
74/01/22	11 12		0.600	2.000	0.575	1.150	1.900
74/02/08	09 15		0.650	0.850	0.240	0.680	1.050
74/02/21	10 35		0.750	0.700	0.200	0.800	1.100

STORET RETRIEVAL DATE 76/01/06

1309G1 1309G1
33 27 00.0 083 49 00.0
BEAR CREEK
13 NEWTON CO HWY MA
T/JACKSON LAKE
MCDONALD RD BRDG 4 MI NE OF STEWART
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/10	14 45		0.350	1.800	0.100	0.019	0.035
73/04/14	14 30		0.310	0.830	0.055	0.013	0.040
73/06/04	09 45		0.450	0.400	0.031	0.024	0.080
73/07/14	14 40		0.520	0.200	0.021	0.026	0.037
73/08/11	11 00		0.570	0.100	0.014	0.038	0.040
73/09/10	10 30		0.480	0.440	0.088	0.031	0.040
73/10/13	14 18		0.340	0.650	0.115	0.033	0.035
73/11/04	11 00		0.198	0.250	0.040	0.010	0.025
73/12/09	11 18		0.336	0.700	0.048	0.024	0.050
74/01/11	14 20		0.530	0.200	0.050	0.025	0.055
74/01/22	11 44		0.470	0.400	0.040	0.030	0.097
74/02/08	09 40		0.450	0.200	0.040	0.015	0.060
74/02/21	10 10		0.440	0.200	0.025	0.012	0.070

< VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/01/06

13098A TF1309BA P012000*
33 46 30.0 084 03 00.0
SNAPFINGER CREEK-DECATUR #1
13 1:250000 ATLANTA
T/JACKSON LAKE
SHOAL CREEK
11EPALES 2141204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
73/08/13	08	00							
CP(T)-			0.450	17.400	8.200	6.300		6.250	8.900
73/08/13	20	00							
73/09/10	08	00							
CP(T)-			0.294	23.000	11.600	6.100	7.025	5.850	7.970
73/09/10	16	00							
73/10/15	00	00							
CP(T)-			0.032	39.000	10.600	8.000	9.100	7.600	8.700
73/10/15	08	00							
73/11/19	00	00							
CP(T)-			1.980	26.000	15.800	9.200	11.000	5.600	5.200
73/11/19	08	00							
73/12/17	08	00							
CP(T)-			2.700	14.500	5.700	6.400	8.100	5.900	6.080
73/12/17	16	00							
74/02/15	08	00							
CP(T)-			1.320	11.000	6.600	4.400	5.600	7.300	9.100
74/02/15	16	00							
74/03/11	08	00							
CP(T)-			1.320	17.900	8.800	5.300	7.150	9.460	7.880
74/03/11	16	00							
74/04/08	08	00							
CP(T)-			0.680	16.000	7.700	4.300	6.100	8.800	9.900
74/04/08	16	00							
74/05/06	08	00							
CP(T)-			0.440	23.000	9.800	5.800	7.500	7.500	8.000
74/05/06	16	00							
74/06/03	08	00							
CP(T)-			0.440	26.000	14.500	7.700	8.600	7.400	8.200
74/06/03	16	00							
74/07/08	00	00							
CP(T)-			0.320	24.000	1.500	6.300	7.100	8.800	8.400
74/07/08	08	00							
74/08/05	08	00	0.170	25.000	15.700	0.110	7.100	7.660	6.580

STORET RETRIEVAL DATE 75/01/06

1309BB TF1309BB P044000
33 41 30.0 084 23 30.0
ATLANTA #1
13 FULTON CO. MAP
T/JACKSON LAKE
SOUTH RIVER
11EPALES 2141204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
73/04/30	07	00							
CP(T)-			4.100	16.000	4.600	7.750	10.500	4.600	3.000
73/04/30	13	00							
73/05/21	07	00							
CP(T)-			3.600	16.000	7.200	6.400	8.700	2.100	3.900
73/05/21	13	00							
73/06/25	07	00							
CP(T)-			0.460	13.800	5.300	6.200	8.000	1.900	2.700
73/06/25	13	00							
73/07/30	07	00							
CP(T)-			1.760	9.700	2.000	3.800	8.200	3.000	3.000
73/07/31	01	00							
73/08/27	07	00							
CP(T)-				8.900	3.800	8.000	9.700	1.800	2.500
73/08/28	07	00							
73/09/24	07	00							
CP(T)-			1.890	13.000	6.800	6.600	7.900	3.200	1.800
73/09/25	07	00							
73/10/29	08	00							
CP(T)-			6.000	23.000	12.600	7.100	9.100	3.500	2.300
73/10/30	01	00							
73/11/27	08	00							
CP(T)-			7.000	10.500	2.300	6.500	8.900	4.100	3.700
73/11/28	01	00							
73/12/27	08	00							
CP(T)-			6.600	19.000	7.400	5.600	8.600	3.900	3.600
73/12/27	13	00							
74/01/28	08	00							
CP(T)-			4.900	8.400	3.600	4.300	6.900	3.900	2.600
74/01/29	01	00							

STORET RETRIEVAL DATE 75/01/06

1309BC AS1309BC P112000
33 41 30.0 084 23 30.0
ATLANTA #2
13 FULTON CO. MAP
T/JACKSON LAKE
SOUTH RIVER
11EPALES 2141204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
73/04/30	07	00							
CP(T)-			0.102	14.800	6.350	6.860	8.600	8.500	8.500
73/05/01	06	00							
73/05/20	07	00							
CP(T)-			0.095	16.000	5.400	7.500	9.475	13.000	8.600
73/05/21	06	00							
73/06/25	07	00							
CP(T)-			0.080	14.700	7.400	6.600	7.800	12.500	11.100
73/06/26	06	00							
73/07/30	07	00							
CP(T)-			0.100	12.000	3.600	4.400	7.500	13.700	12.300
73/07/31	06	00							
73/08/27	07	00							
CP(T)-				16.000	7.000	6.850	9.400	13.600	12.400
73/08/28	07	00							
73/09/24	07	00							
CP(T)-			0.210	14.700	8.600	5.300	6.100	14.300	10.900
73/09/25	07	00							
73/10/29	08	00							
CP(T)-			3.300	17.000	7.500	5.200	7.300	6.600	11.700
73/10/30	08	00							
73/11/26	08	00							
CP(T)-			1.150	14.000	5.400	5.200	7.300	11.200	8.500
73/11/27	08	00							
73/12/27	08	00							
CP(T)-			0.400	17.000	5.500	3.640	7.100	12.900	9.400
73/12/28	08	00							
74/01/28	08	00							
CP(T)-			0.440	11.000	4.600	3.520	5.800	13.100	12.500
74/01/29	08	00							

STORET RETRIEVAL DATE 75/01/06

1309FA TF1309FA P010400*
33 36 00.0 089 51 30.0
COVINGTON
13 7.5 COVINGTON
T/JACKSON LAKE
DRIED INDIAN CREEK/YELLOW RIVER
11EPALES 2141204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
73/04/19	11 00								
CP(T)- 73/04/19	15 00		1.160	7.000	4.100	9.900	11.500	1.570	1.630
73/05/17	11 00								
CP(T)- 73/05/17	15 00		0.735	11.000	5.600	12.400	14.700	1.450	1.350
73/06/13	11 00								
CP(T)- 73/06/13	15 00		1.260	7.400	2.938	12.000	13.800	1.340	1.540
73/07/18	11 00								
CP(T)- 73/07/18	15 30		1.640	7.000	2.940	5.900	7.100	1.170	1.470
73/08/15	11 00								
CP(T)- 73/08/15	15 00		1.150	11.500	4.700	21.700		1.530	1.530
73/09/12	11 00								
CP(T)- 73/09/12	15 00		0.720	12.600	5.050	21.000	25.000	1.440	1.260
73/10/17	10 00								
CP(T)- 73/10/17	15 00		0.480	13.500	3.990	27.000	31.000	1.300	1.260

STORET RETRIEVAL DATE 75/01/06

130921 TF130921 R037000
33 46 30.0 084 03 00.0
SHOAL CREEK-DECATUR #2
13159 1:250000 ATLANTA
T/JACKSON LAKE
SHOAL CREEK
11EPALES 2141204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
73/08/13	08	00							
CP(T)-			4.400	11.500	4.880	7.600		4.540	4.180
73/08/14	08	00							
73/09/10	08	00							
CP(T)-			5.000	8.600	3.100	8.920	10.050	4.000	4.880
73/09/11	07	00							
73/10/15	00	00							
CP(T)-			2.900	11.000	5.100	8.700	9.700	3.670	3.980
73/10/15	24	00							
73/11/19	12	00							
CP(T)-			3.000	12.500	5.400	9.200	10.500	3.480	3.730
73/11/20	12	00							
73/12/17	08	00							
CP(T)-			1.760	18.000	6.600	7.700	10.000	3.800	3.100
73/12/18	07	00							
74/01/15	08	00							
CP(T)-			1.920	11.000	6.800	7.300	8.900	4.600	3.590
74/01/16	07	00							
74/02/11	00	00							
CP(T)-			1.240	14.000	7.420	7.500	9.250	4.100	3.800
74/02/11	24	00							
74/03/10	08	00							
CP(T)-			5.100	7.000	3.900	7.700	8.500	2.960	2.900
74/03/11	08	00							
74/04/08	08	00							
CP(T)-			4.700	7.700	4.100	4.975	6.200	2.530	2.420
74/04/09	07	00							
74/05/06	09	00							
CP(T)-			7.500	14.300	7.900	7.800	9.700	4.700	4.700
74/05/07	08	00							
74/06/03	08	00							
CP(T)-			7.400	14.000	7.200	7.300	9.100	3.000	3.150
74/06/04	08	00							
74/07/08	00	00							
CP(T)-			4.120	11.000	7.300	6.700	7.700	2.920	3.160
74/07/08	24	00							

STORET RETRIEVAL DATE 75/01/06

130921 TF130921 P037000
33 46 30.0 084 03 00.0
SHOAL CREEK-DECATUR #2
13159 1:250000 ATLANTA
T/JACKSON LAKE
SHOAL CREEK
11EPALES 2141204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 N02&N03 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
74/03/05 00 00 CP(E)- 74/04/05 24 00			4.400	13.000	5.700	3.000	4.100	3.060	2.990

STORET RETRIEVAL DATE 75/01/16

130931 AP130931 P006000*
33 47 30.0 083 44 00.0
MONROE
13 1:250000 ATHENS
T/JACKSON CREEK
MOUNTAIN CREEK/ALCOVY RIVER
11EPALES 2141204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
73/07/01	11 00		0.031	24.000	24.500	3.100	5.250	1.050	1.050
73/08/01	11 00							1.050	1.050
73/09/01	11 00			13.000	5.000	2.900	3.700	1.050	1.050
73/10/01	11 00		0.210	10.400	1.150	2.730	3.900	1.050	1.050
73/11/01	14 00		0.320	11.000	1.470	2.900	3.800	1.050	1.050
73/11/30			0.110	12.500	3.030	2.700	4.100	1.050	1.050
73/12/31	12 00		0.120	15.530	3.520	2.600	4.200	1.050	1.050
74/02/04			0.160	16.000	4.500	2.500	23.000	1.050	1.050
74/04/02			0.150	12.000	3.150	2.600	3.700	1.050	1.050
74/05/01			0.120	16.000	6.500	2.700	4.200	1.050	1.050
74/06/04	15 30		0.200	15.000	4.800	3.000	4.000	1.050	1.050
74/07/02	16 00		0.150	12.000	2.100	3.200	4.300	1.050	1.050
74/09/01	14 00		0.240	14.000	1.700	3.600	5.200	1.050	1.050

STORET RETRIEVAL DATE 75/01/06

130941 TF130941 P149000
33 42 35.0 084 20 43.0
ATLANTA #3
13 DEKALB CO. MAP
T/JACKSON LAKE
INTRENCHMENT CREEK
11EPALES 2141204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
73/05/01	08	00							
CP(T)-			2.500	12.000	2.900	4.000	4.900	15.200	15.500
73/05/02	07	00							
73/06/12	00	00							
CP(T)-			2.500	14.000	5.000	4.400	6.100	17.500	15.500
73/06/12	24	00							
73/07/10	00	00							
CP(T)-			3.800	11.000	3.990	4.100	5.900	15.800	15.300
73/07/10	24	00							
73/08/07	00	00							
CP(T)-			4.400	5.600	2.600	2.200	4.900	19.000	19.000
73/08/07	24	00							
73/09/04	00	00							
CP(T)-			9.470	10.500	3.800	5.050		15.000	14.000
73/09/04	08	00							
73/10/02	08	00							
CP(T)-			4.600	9.400	3.400	3.150	4.500	14.000	14.000
73/10/02	16	00							
73/11/07	00	00							
CP(T)-			4.500	14.500	1.540	4.700	6.800	13.000	12.900
73/11/07	24	00							
73/12/04	08	00							
CP(T)-			3.400	14.000	1.540	4.900	6.300	13.500	12.400
73/12/05	08	00							
74/01/02	08	00							
CP(T)-			5.410	8.800	2.400	3.500	4.450	12.800	12.600
74/01/03	08	00							
74/02/04	08	00							
CP(T)-								15.000	13.900
74/02/05	08	00							